

A Simple Inpatient Psychiatric Clinical Information System Designed and Developed by Clinicians

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ABSTRACT

***Objective:** The growth of computer technology allows clinicians to develop a separate information system to replace inefficient paper-based approaches to documenting clinical care. **Methods:** A clinician team developed a system to replace standard paper forms using computer software running on 486 PC computer. Clinicians, directing the project at every step, refined handwritten forms to create a complete word processor application merging information from an individual database. **Results:** A system developed outside the traditional hospital information system simplifies the generation of a variety of required inpatient documents (treatment plans, progress notes, patient lists, and treatment summaries). A wide variety of clinicians converted from a traditional paper-based approach to the computer system. **Conclusions:** Computer technology allows the local development of an information system oriented toward clinical needs. Hospital clinical information systems will benefit from the input of clinicians with experience designing a computerized solution.*

INTRODUCTION

Many sites are developing an electronic medical record incorporating on-line information entry and retrieval. Such systems clearly represent the future of health care delivery and documentation. Clinicians waiting for such systems to evolve are still saddled with repetitive, inefficient, paper-based approaches to clinical care. This is especially true for providers of care to psychiatric patients. This paper describes a clinical information system designed and developed by clinicians to aid the process of inpatient psychiatric treatment.

Many currently available computerized medical information systems require clinicians alter their

treatment to fit a more structured approach [1-4]. Other systems focus on reducing costs rather than saving time [5]. Such software is typically not developed and altered by numerous clinicians who work daily with patients and the information system. Clinicians typically function as consultants to a non-clinician (or single clinician) software development team. Once developed such software is not usually altered except in minor ways.

Significant clinician involvement improves the functionality of a system [6, 7]. A clinician team (medical students, residents, attending physicians or nurse clinical coordinators) started the project because of their interest in improving the process of providing psychiatric care and their belief that a computer would be an essential tool. They believed that clinicians working with the software in a clinical setting and empowered to change the system would generate an even higher quality product than the above more traditional model.

Older computer technology might not have allowed true clinician based prototyping because of cost and complexity. Advances in hardware and software technology, however, allow clinicians to investigate the potential benefits of computer technology without depending on an information specialist [8, 9].

The initial clinician team identified the most burdensome and repetitive aspect of patient care: preparation of documentation. The developers attempted to replace paper-oriented tasks with a computerized approach. The team chose the latest and simplest technology (graphical word processing software running on Windows™) to improve the chances for long-term acceptability.

This project strove to develop the software incrementally over a 1 year period by allowing the users to develop the software. Clinicians completely guided and developed the system and insured the system remained focused on the needs of clinicians.

Users joined the development and altered the system to make it easier and more functional. This project can serve as model upon which information specialists can build.

METHODS

System Environment

The project used four standard PC-compatible computers incorporating 486 processors and high quality SuperVGA monitors. Each machine had Windows for Workgroups™ installed. Microsoft Word™ managed the creation of paper documents, entry of data and printing of documentation. One of the computers stored template documents and patient information files that were made available to all other computers. This computer also coordinated requests to print to a laser printer.

Work Environment

A 30 bed inpatient psychiatric unit served as the test site. The university based unit primarily treats patients with Schizophrenia, Schizoaffective and Bipolar disorders. At a given time, users of the system include two attendings, four residents, a chief resident, and six to eight medical students.

Installation

All computers arrived with Windows installed. Staff installed word processing software, upgraded Windows to the version supporting file and printer sharing, and connected the four computers together with standard coaxial cabling. A non-public room requiring a special clinician key for access housed the four computers and printer.

Development

The standard computer configuration was chosen based on the experience of the first author (TBT). Because the system would be further designed and maintained by computer novices, common and easily supported software was selected. All later decisions were made by users of the system at a given point in time (described below as members of the team).

The team changed every three months as a new set of attending and resident physicians joined the unit.

Users typically had either no typing experience or minimal computer skills such as an understanding of a DOS-based word processor. The first author assumed responsibility for keeping the project focused and maintaining a common interface for all users.

The team first altered standard treatment plans to convert them to a word processor format. Over a two month interval, the team optimized the template to provide information in a more pleasing and useful format while still conforming to the purpose of the documentation. The medical records committee approved the altered treatment plan form. The team similarly altered the daily progress notes and medication reorders.

If forms required similar information, the team altered the forms to allow them to share common information. For example, "Observations" on the progress note roughly correlated to "Progress Toward Goals" on the treatment plan. "Problems" on the progress notes was identical to "Identified Problems" on the treatment plan.

The following areas fully covered the process of documenting care.

Patient name (e.g., Doe, John)
ID # - The hospital unique identification number
Demographics - Age, Marital Status, Race, Sex
(e.g., 36yo SBM)
Admission date
Legal Status (Voluntary or type of commitment)
Next date for commitment hearing

Problems
Strengths
Findings/Observations
Primary diagnosis
Assessment
Medications
Plan

Minimum discharge criteria
Planned discharge date
Follow-up arrangements (Date, Time, Clinic)
Follow-up clinician and physician

The above categories formed the framework for a simple mail-merge database. A mail-merge database is essentially a table where columns represent the data items (as above) and there is one row per patient.

The system did not interfere with the process of entering information. It did not correct data entry

errors or verify data (such as checking to insure that dates were valid). The system allowed free text and did not require the data be encoded (e.g., use of a diagnostic code or clinician ID number). The development team decided that such additions would not add sufficient value to the system and would potentially lead to a more complex system requiring additional training and effort. They decided to keep the project focused on simplifying the process of documenting the provision of care.

Because the system focuses on replacing handwritten documentation, retaining information after discharge was unnecessary. The hospital chart remained the sole repository of clinical reports generated by the system. The development team rejected the possible benefit of extending the system to store information after discharge. Storing information saved only a small amount of time if a patient required readmission. The more complex design and difficulty of protecting confidentiality outweighed the potential time-savings.

The team continually updated the documentation system to improve legibility and clarity. They also continued to identify repetitive data entry and make necessary changes to the mail merge database structure and the documentation forms. The top priority remained ease of use.

Enhancement

The team investigated additional applications of the database that might improve care and reduce paperwork time commitments. A resident typically organizes him or herself by creating lists of the most significant patient information as well as *to do* lists. Creating and organizing these lists requires significant time expenditure. The clinician team produced a simple *patient information sheet* by pulling required data from the mail-merge database. The mail-merge database already included essential historical information such as problems and medications. A resident's *To do* items were best placed in the *Plan* area of the database. The new information sheet created a useful list of essential information for each patient without requiring additional effort.

An additional use of the software was identified when physicians covering the unit on a weekend mentioned a desire for more information. They noted they did not have enough information to answer some questions such as queries about discharge planning. The team created a *covering attending progress note* to address this limitation. These forms were printed

Friday afternoon by the residents and detailed the problems, medications, and discharge plan. The note left space for weekend attendings to write their findings, assessment and plan. Access to essential clinical information allowed covering attendings to spend more time interviewing patients and less reviewing charts.

Deployment

In a one year period, approximately 50 clinicians on the inpatient unit used the system. All covering attendings use the weekend progress notes. Users included psychiatry residents, attending physicians, medical students, nurses and a psychology intern. Training occurred via a hands-on approach. In the later stages of the project, the head nurse (previously a novice computer user) assumed responsibility for proper training.

RESULTS

Clinicians working on the unit readily accepted the system designed above. With the exception of a one hour introduction from the head nurse, new users learned the system from experienced users. All users became proficient enough at typing to use the system.

At the end of a one year period all residents, attendings, and medical students were using the system to generate progress notes. All treatment planning documentation changed from handwritten to almost completely typewritten.

Attendings covering the unit on the weekend successfully converted from dictated or handwritten notes to the new weekend progress note system. Attendings noted a decrease in time dedicated to paperwork, and more importantly, a better understanding of patients' problems, treatments, and discharge plans.

More legible documentation has led to easier chart reviews, identification of problems and communication between treatment providers. Residents and medical students have noted that the system allows them to keep track of a greater number of problems. They also note their knowledge of the problems is more detailed. Residents who subsequently worked on inpatient units that do not use the mail-merge system have commented on the difficult readjusting to the old handwritten system. Residents note that the handwritten system wastes time by requiring them to rewrite similar information

for different forms. They also mentioned an inability to maintain as full and complete of a problem list without the benefit of automation.

There have been no reports of breaches of confidentiality or inappropriate use of the computer.

DISCUSSION

We have developed a system that simplifies the process of providing and documenting patient care without creating a complicated information structure. This clinician driven system solves clinician needs based solely on clinician input.

The acceptance of the system on the part of numerous residents and attendings is a testament to the success of the system. The change in documentation from handwritten to typewritten should also be seen as a significant change.

It is difficult to quantify the impact of the new system. In the hectic inpatient environment, measurement of time spent documenting is difficult. Full evaluation of the new database system would require a control group using the old handwritten system. Clinicians are reluctant to revert to the old handwritten system - a system seen by most users as inadequate.

The successful protection of patient confidentiality is due to the placement of computers in a secure area, the limitation of the system to the generation of documentation, and the deletion of patient information after discharge.

The product of this design process has some significant weaknesses. The clinician driven system lacks error-checking, encoding, or other standard approaches to collecting data. The lack of structure makes it impossible to analyze trends or collect summary data. Nonetheless, the system has outlined the essential clinical information and defined computer-generated reports which satisfy medical record requirements.

No formal relational database is used and the system is unconnected to a more comprehensive information system. Such a system may be able to further reduce time spent documenting treatment by eliminating the need to enter data already collected elsewhere. A true client/server database is currently being developed. The database developers are building upon the success of the clinician-designed system.

CONCLUSIONS

The project demonstrates that clinicians can take the first step toward reducing paperwork, improving documentation, aiding communication and clarifying the treatment plan. This project created a system that satisfied clinicians and was enthusiastically implemented by them.

Although it is possible to wait for a better solution to come along, it is prudent to use the technology available today to improve patient care. A clinician designed system provides a template for designers of more complete medical information systems.

Clinicians with an understanding of the benefits of computerization will hold further development to a high standard. Clinicians with experience using a system designed for their purposes will be more active in the process of designing the electronic medical record. Their involvement is essential to developing a comprehensive system that actually improves the quality of medical care.

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